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Myths and Legends Related to Eclipses

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N. C. Rana



Vigyan Prasar

Published by
VIGYAN PRASAR
Technology Bhavan, New Mehrauli Road
New Delhi- 110 016
Phones : 6866675, 6965980, 6965978
Fax : 11- 6965986

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Edited by : Narender K. Sehgal
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ISBN : 81-7480-006-9

Layout and Design at Vigyan Prasar by Shri Ganesh A. Hegde

Ilustrations : N. C. Rana

Printed in India

Contents

Foreword

This is one of a set of publications brought out by Vigyan Prasar in connection with the total solar eclipse of October 1995 visible from parts of India. In this small volume, Professor Rana has not only compiled superstitions, myths and legends relating to eclipses from all major cultures, periods and religions, he has also attempted to examine the 'rationale' behind them relevant to the context, the circumstances and the times of their origin. This, however is not to be seen or interpreted as an attempt to eulogise superstitious beliefs. That is definitely not the intention.

Considering the fact that eclipses were among the earliest of natural phenomena to have been understood and taken out of the realm of superstition and brought into the domain of science, it is surprising that some of the mythical and superstitious beliefs continue to persist till this day. Those individuals who actually are able to safely witness an eclipse would in all probability overcome their fears/anxieties if they have any; also for them the 'credibility' of the prevailing myths and supersti tious beliefs would diminish greatly if not vanish altogether; and they would also be in a better

position to help their near and dear ones to shed and overcome their fears.

Perhaps, if we can understand and unravel the dynamics of their perpetuation, it might lead us into devising more effective strategies to first counter and then demolish some of the prevailing myths and superstitions. It is our hope that this volume would contribute toward such efforts.

For obvious reasons this compilation lays no claim to being complete or comprehensive. In fact, suggestions on inclusion of additional relevant material in a future edition would certainly receive consideration.

Narender K. Sehgal
Director
Vigyan Prasar

New Delhi
September 12, 1995

Preface

Eclipses have captured the imagination of one and all at sometime or the other in the history of mankind. In this booklet, an attempt has been made to present the prevailing superstitious practices of different cultures and religious traditions. On the whole, the fables which developed around the theme of eclipses have stood the test of time. Here we have tried to understand the rationale underlying certain beliefs and rituals observed by different communities, in the light of the now available scientific knowledge about the phenomena of eclipses. With the advent of the industrial revolution, there has been a growing need for developing a scientific temper within society at large. The author sincerely believes that the National Council for Science & Technology Communication (NCSTC) has been doing a remarkable service to Indian society by nurturing the spirit of inquiry in a variety of ways. The author feels that unless the reasons behind the continuing eclipse-oriented rituals and practices are made credible to the older as well as the younger generation in India, the age-old, deep-rooted superstitions cannot be dispelled. It is hoped that this booklet will be a valuable addition to NCSTC's armoury in its crusade against institutionalised

superstitions. The author is particularly thankful to Dr. V.B. Kamble and Dr. Narender K. Sehgal for encouraging him to write this booklet, which turned out to be an educative experience for the author.

The author is thankful to the Inter-University Centre for Astronomy and Astrophysics (IUCAA) for extending its facilities to produce this booklet. Thanks are also due to Shri Ajit Ghodke, Shri Dnyaneshwar Kul, Shri Sumeet Gawande, Ms. Harshada Deshpande, Ms. Aparna Athani, Shri Dinesh Apte and Ms. Mridula Chandola for helping out in various ways, from collecting material, translating it into English whenever needed, to drawing figures. Thanks are also due to Ms. Niti Anand who went through the manuscript several times and edited it from the language point of view, making it more agreeable to the lay-readers.

N. C. RANA

Introduction

Eclipses are among those few celestial phenomena that cannot go unnoticed even by plants and animals, let alone humans, particularly when it is a total solar eclipse. The partial eclipses of the Sun may go unnoticed, but not so those of the Moon. Eclipses do not last long; they occur all of a sudden, without any warning, and disappear altogether within a few hours leaving the viewer totally bewildered. The disturbance in the regular, clockwork, precise celestial motions of the Moon and the Sun caused by eclipses evoke a feeling of awe--the sense that almighty gods such as the Sun and the Moon can be temporarily overpowered by 'something' akin to celestial 'demons'. It was not the natural occurrences of floods or droughts or earthquakes that were originally thought to be demonic, but the mere evidence of celestial phenomena, such as the unwarranted appearance of a comet, a shower of shooting stars, the retrograde motion of planets and, most dramatic of all, the occurrence of total solar eclipses of the Sun and the Moon. In their desperate attempts to reason out such unusual celestial happenings, it was therefore natural for our primitive ancestors to ascribe anything and everything ominous to irregularities in the heavenly order.

Surely, the human brain is fertile enough to establish what are called statistical correlations between terrestrial disasters and celestial oddities. But statistical correlations are of two kinds: spurious and physical. The physical ones are those that can be explained through a chain of cause and effect relations, and the magnitudes of the claimed effects can be well justified quantitatively. But spurious statistical correlations are those that defy the criterion of quantitative justification, even if they are seemingly connected by a chain of cause and effect relations. This is how a lay person can be fooled--by presenting arguments with very obvious qualitative links between two sets of information or events, without adequate quantitative substantiation.

In the context of eclipses, we shall demonstrate the gross differences between physical and spurious correlations in order to understand not only the phenomenon itself, but also the plausible origin and institutionalisation of certain superstitious practices prevailing over several thousands of years.

We generally tend to opine that with the advent of modern science, many events, otherwise inexplicable, have been successfully explained; the expanding frontiers of our knowledge have pushed all of us into a bewildering world of technological innovations, where the pace of change has accelerated from several decades to years and even months.

Unlike in the previous centuries, the parents today have a tough time dealing with the inquisitiveness of their offsprings who are exposed to a wide range of media networks. It is not an easy task to completely break away from the traditions of the older generations; it is equally difficult to assert their validity, particularly when the youngsters are equipped with razor-sharp arguments backed by proper scientific explanations.

Of course, we know that the ordinary high school textbooks give fairly clear cause and effect explanations of eclipses, yet the majority of the people in India still shy away from viewing them. But this is not something that ancient Indians did not know about. Even fifteen hundred years ago, Aryabhata I (499 A.D.), the celebrated Indian astronomer, had clearly stated in the chapter 'Goladhyaya' of his book *Aryabhatiya:* The shadow of the earth falling on the Moon causes the phenomenon of lunar eclipse (Fig.1) and the shadow of the Moon falling on the surface of the earth causes a solar eclipse (Fig.2); thereafter, he gives the formula for calculating the time and durations of eclipses. If nothing much has changed in the attitude of the common man towards viewing the eclipses, we had better seek the cause for the perpetuation of this particular irrational tradition in a different perspective, rather than solely blaming the ignorance of the people.

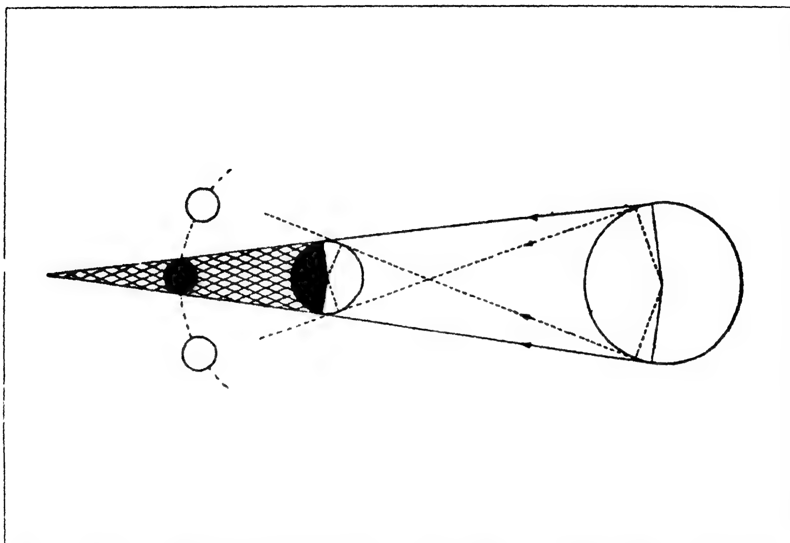


Fig. 1: Demonstration of a lunar eclipse. The Sun on the left is casting the shadow of the Earth (in the middle). As the Moon (shown on the right) passes through the shadow of the Earth, a partial lunar eclipse will begin which will then become a total eclipse, as shown in the middle frame. This picture is not unusual, except for the fact that the various tangents drawn on the Sun and the Earth for grazing rays of light do originate from different parts of these two discs, unlike in many textbooks where the drawing is made incorrectly.

How deep-rooted these eclipse-related superstitions are becomes evident when a special event such as a total solar eclipse hits the headlines of all the newspapers. Unfortunately, and quite regrettably, the general attitude of the mass media in India has remained democratic enough to reflect the majority's viewpoint! This was amply exemplified during the last total solar eclipse of 16 February

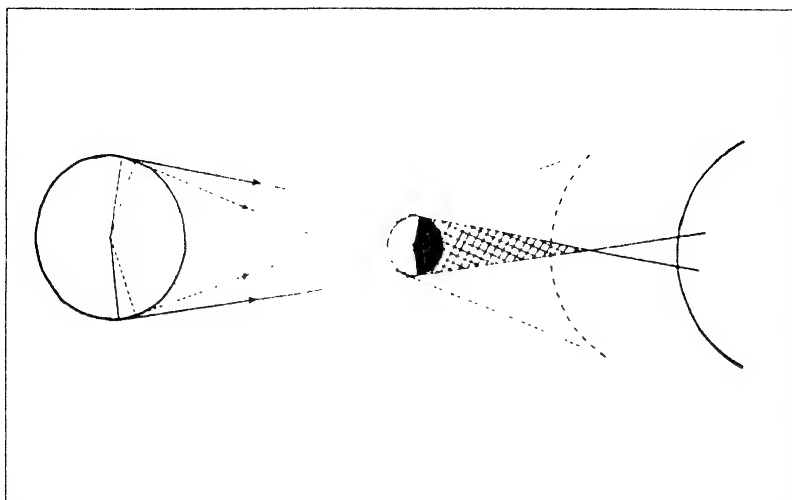


Fig. 2: Demonstration of a central solar eclipse. Here the Sun is on the left, the Moon is in the middle and the Earth is shown by two different locations. Either the Moon's umbral shadow (the cross-hatched portion) or the extension of the shadow cone falls on the Earth, depending primarily upon the distance between the Moon and the Earth, as the eccentricity of Moon's orbit is about three-and-a- half times that of the Earth around the Sun. If the Earth's relative position is better described by the dashed curve, there will be a total solar eclipse, but if it resembles more closely the one described by a solid curve, there will be an annular solar eclipse.

1980. When the eclipse became visible over some parts of southern India, Doordarshan felt obliged to telecast a film during those few hours in order to encourage the viewers to stay indoors. The streets of the big metropolitan cities in India appeared deserted, not because of their inhabitants' mission of viewing the total solar eclipse in its narrow belt

of totality, but primarily because of the age-old taboo on viewing eclipses directly. Remember that the above-mentioned total solar eclipse embraced the Indian subcontinent after a long pause of 82 years!

* * *

A Glimpse of Eclipse Related Superstitions Throughout The World

IN this section we will briefly describe the various kinds of eclipse-related superstitions prevalent all over the world, and also indicate the rationale behind such practices as spelt out by the local priests and or the governors.

Since time immemorial, eclipses have been interpreted in various ways by different communities all over the world, reflecting many a time the working philosophy of the religious denominations they belong to.

The lunar and solar eclipses have, by and large, been held to bring in their wake calamities like epidemics, wars, etc.. It has been a common practice to observe several do's and don'ts with religious overtones so as to avoid such cataclysmic fallouts of eclipses as well as hasten their end.

In ancient Egypt (c. 2650 B.C.) the clan of the ruling kings, the Pharaohs, thought themselves to be direct descendants of the Sun, and therefore, the earthly representative of their Sun god. The king

walked around their main temple of Osiris till the solar eclipse was over. The idea behind this rituals seems to be the wish that the Sun should keep on moving continuously in the sky without any obstruction. When the Sun becomes engaged in a process of eclipse, his human representative, namely the Pharaoh, must do whatever best he can on his behalf to ensure his regular motion in the sky (Fig.3).

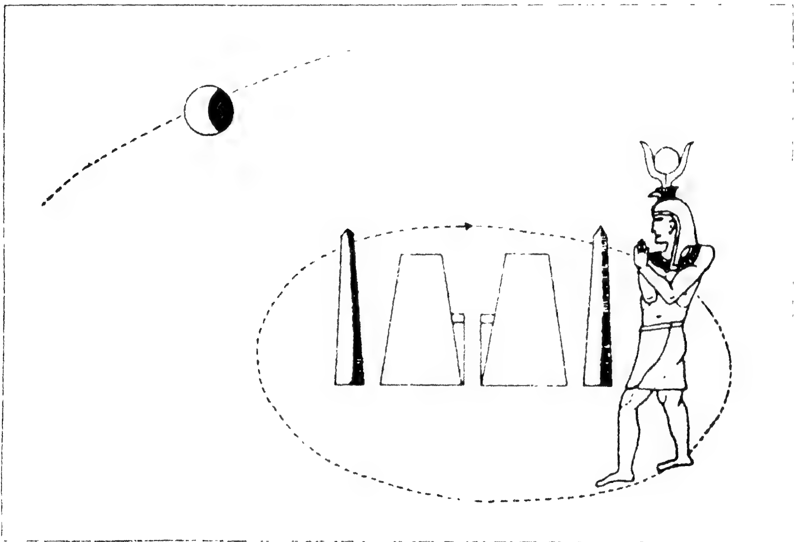


Fig.3: The ancient Egyptian kings regarded themselves as the terrestrial incarnations of their Sun god. During an eclipse the king himself used to revolve around their Sun temple, in the belief that the regularity of the Sun's motion should be maintained by him once it had become eclipsed.

Eclipses became quite accurately predictable at the hands of the Babylonians, who among other

things discovered what is known as the Saros cycle of eclipses. Eclipses are found to recur once every 6585.321 days (corresponding to 18 years and 10.3 or 11.3 days, depending upon whether there are five or four leap years in between). Babylonians kept very meticulous observational records of astronomical interest, from about 1800 B.C., in the form of several tens of thousands of clay tablets. They also kept weather charts and documented all the natural calamities as well as the downfall and ascendance of the Babylonian rulers. Some of these clay tablets survived till about the eighth century B.C., and the Assyrians and the Greeks developed a theory of the universe. In fact, the Greek historian Herodotus (c. 485-c.425 B.C.) narrates the case of Thales of Miletus who accurately predicted that a total solar eclipse would occur in the year 585 B.C. A war between the Lydians and the Medes ended in a truce due to the occurrence of this predicted eclipse while they were in the battlefield.

The Babylonians, regarded eclipses as highly important omens. Though the date and place over which an eclipse was visible in the sky were accurately recorded, still there is a possibility that these events might have been entered under the title 'the Sun becoming the Moon', which could also indicate dust storms.

Omens regarding the lunar eclipses are more

abundant than those for the solar ones. Not only was a total lunar eclipse regarded as universal--since it would be visible from a large part of the globe--it was also seen to be impartial in its intensity given the totally eclipsed disc of the Moon. On the contrary, a partially eclipsed Moon would have one of its four sides (western, southern, eastern or northern) obscured. Depending on the side of the lunar disc eclipsed to the maximum extent, it was possible for the Babylonians to ascertain which geographical directions pointing to the neighbouring kingdoms would experience a bad or good phase. Such details are to be found in their compendium, known as *Enuma Anu Enlil*. Each entry in the record of a watch of a lunar eclipse included detailed data on the exact year, month, date, day of the week, hour of the night watch, wind and its direction, and location of the star nearest to the eclipsed Moon in the sky. From all these factors, the nature of the omens could be ascertained. For example, we find the following report on a certain eclipse (lunar) in the month of Simannu occurring just before dawn:

> An eclipse in the morning-watch meant contracting to diseases.... The morning watch is toward Elam, the 14th day is over Elam, Simannu is at Amurru, the second side is towards Akkad.... When an eclipse occurred during the morning watch and it lasted for the entire duration of the watch, and at the same time the north wind was blowing, any sick person viewing it will recover.

> On the other hand, when the eclipse started on the first side and stood on the second side, there would be a slaughter of Elam; Guti would not approach Akkad.... When an eclipse happens and stands on the second side, gods will have mercy on the land.... When the eclipse is in the month of *Simannu*, there will be flood....

More detailed ones would warn the kings about possible disasters in an ensuing war, and prescribe the most favourable geographical directions for a possible victory, and so on.

Many a such rich enumeration of omens had a profound significance not only for the then astrologers but also for the then rulers of the territories. One should always remember that in those ancient times there was no distinction between what are now formally classified as astronomy and astrology. Our aim is to filter out the astronomy component, and give a thought to finding out plausible reasons as to why certain ritualistic details figured in the form of astrological conventions. Details such as these indicate fairly accurate observations of the eclipses. Thus, the Babylonians had mastered the art of predicting the eclipses before the seventh century B.C. For example, it is stated in Thompson (p. 273): "On 14th an eclipse will take place, it is evil for Elam and Amurru, lucky for the king, my lord, rest happy. It will be seen without Venus. To the king my lord I say thee: there will be an eclipse."

As it happened the day turned out to be cloudy and the eclipse was not sighted. This was interpreted as : 'The god of Ashur, Tutelary, knowing that no evil threatened the country and its king drew the curtain of cloud over the horizon so that the king and his subjects should not be unnecessarily frightened'. This interpretation is important because this was a period when the king was ill and had returned from an unsuccessful Egyptian campaign.

According to the Chaldeans, the occurrence of a lunar eclipse signified that the wrath of the Moon had been incurred, resulting in the onset of diseases, famine, war, earthquakes and other natural calamities. Since witnessing the eclipse would cause viewers to suffer from these disasters, they were instructed to stay indoors during its duration.

The Greeks considered an eclipse to be a forerunner of ill omens, and believed that it occurred only when both the Sun god and the Moon god became angry. There were occasions when one part of the territory witnessed the eclipse, while other areas did not. In such instances, inhabitants who lost wars against their neighbours understandably regarded eclipses as bad omens. It is said that the Greeks used to halt and sometimes retreat from a war front if they had sighted an eclipse during their war adventures.

The Roman historian Levy (59 B.C.-A.D. 17) has recorded that during a lunar eclipse it was common practice to scream and shout to drive away the demons who cast their shadows on the lunar disc. Another Roman historian Tacitus (A.D. 55-117) has similarly asserted that people used to make loud noises using drums and cymbals to shorten the duration of the eclipse (Fig. 4).



Fig.4: The ancient Romans used to make loud noises in order to scare away the devil responsible for the eclipses.

Similar practices were observed by people living in Turin. The Armenians thought that eclipses occurred when a black planet invaded the space between the Earth and the Moon (Fig.5). Such an idea is certainly more credible and ingenious,-- it would explain why the darkened portion of the

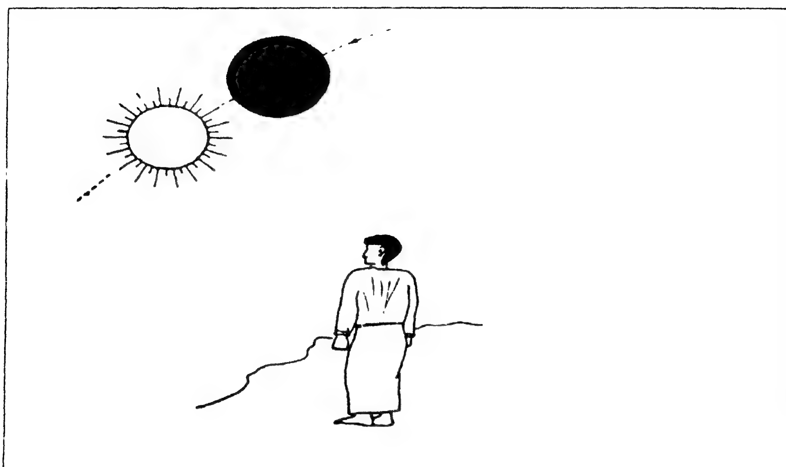


Fig. 5: The Armenians believed that a dark planet passes over the Sun and the Moon on its way causing an eclipse. This hypothesis explained circular boundaries of the eclipsed portions of the Sun and Moon.

eclipsed Sun or the Moon should have a round shape. The idea of demons engulfing the Sun or the Moon does not explain why the two interfaces are circular in nature. However, given the fact that the Sun god and the Moon god are both round in shape and luminous in nature, the celestial demon could have been imagined to have a similar shape though a dark nature. The way a lunar eclipse proceeds is visually not the same as that due to the changes in phase of the Moon. So the idea of shadows engulfing the Moon during a lunar eclipse could also emerge during such early epochs.

Astronomical ideas play their important part in the culture of the Chinese civilisation. It is difficult to arrive at a correct picture of their development as the later Chinese authors try to ascribe an earlier date to relatively more recent ideas to enhance the mystique of their civilisation. Massive burning of books containing extremely valuable records of astronomical interest over a period of at least two thousand years took place in 213 B.C. at the command of the then Emperor Shih Huang Ti. In the ensuing Han period much of the old philosophy was restored, but many distortions crept in when the books were rewritten. The famous example is the story of the Hsi and Hso brothers who were portrayed as being beheaded for failing in their predictions of an eclipse (Fig. 6). In reality both the

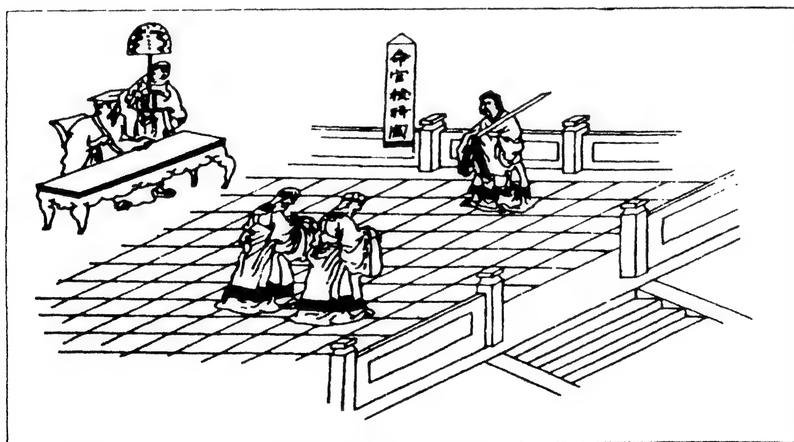


Fig. 6: The legendary Hsi and Hso brothers received capital punishment from the Chinese emperor, Shih Huang Ti, for the inaccuracy of their prediction that a solar eclipse would take place on 22 October 2137 B.C.

brothers were beheaded for having taken sides in a civil strife. The later editions transformed this into the anecdotal, demoralizing tale of two astronomers who in their merry life neglected their duties, failed to predict the solar eclipse, and were punished by decapitation. Since the date (the first day of the autumn) and the location of the Moon (the Moon being stationed in Fang, that is, in Scorpion's head) had been added to the tale, modern astronomers could calculate the date of the above reported eclipse to be 22 October 2137 B.C. But surely, it would be too much to expect an accurate prediction of a solar eclipse in such ancient times. Questions would also arise as to the credibility, if any, of the original tale.

Astronomical rather than cosmological ideas were deeply interwoven in the Chinese way of life. According to its orthodox state religion, China was the centre of the flat earth, the centre corresponding to the celestial pole, and the centre of Heaven. Here the god Shang-ti ruled as the emperor of the Earth, the emperor being 'Son of the Heaven'. He maintained harmony between Heaven and Earth by precisely following the rituals and prescriptions of his forefathers in his action. It was believed that disorders in one realm led to turmoil in the other. In other words, not only were irregularities in Heaven the cause of calamities on Earth, but the evil actions of man (including the rulers) also brought about

disturbances in nature and in Heaven. Eclipses and comets were signs that the emperor and/or his officials had sinned, governed badly, or neglected the ceremonial. According to the astronomical work Shih-Shen of the fourth century B.C.:

> When a wise prince occupied the throne, the Moon follows the right way. When the prince is not wise and the ministers exercise their power in a wrong way, the Moon loses its way. When the high officials let themselves act against the interest of the public as well as monarchy, the Moon goes astray towards north or south. When the Moon is rash, it is because the prince is slow in punishing....

For a long time, the Chinese believed that an eclipse was caused when a dog or some such wild animal bit (by way of casting shadows on) the Sun or the Moon. In order to drive away those animals they used to ring bells loudly. And since the solar eclipse was thought to be a bad omen, they used to fast during the eclipse hours to prevent its recurrence.

During solar eclipses, the Shintos in Japan used to have a talisman, a precious stone-studded necklace, put on the branches of the sacred Clauria tree. The brilliance of these stones was thought to compensate for the amount of sunlight lost during the eclipses (Fig.7). At some places bonfires were lit

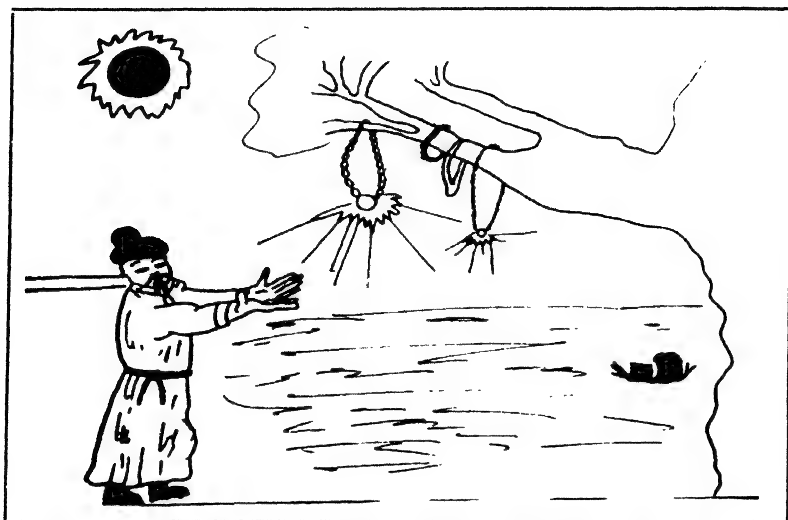


Fig. 7: The Japanese believed that the decline in the intensity of sunshine during a total solar eclipse could possibly be compensated by the glitter of the ornamental stones hung from the branches of the sacred tree, locally known as Clauria.

during the eclipses, with the idea that their light would make good the loss of sunlight and might help shorten the duration of the eclipse, as it did without failure!

Some of the Eskimo tribes also held that eclipses brought the Earth under bad influences, believing further that their failure to place all their utensils upside down before their deities would lead to widespread diseases (Fig.8). Even today, Eskimo women follow this ritual for the duration of the

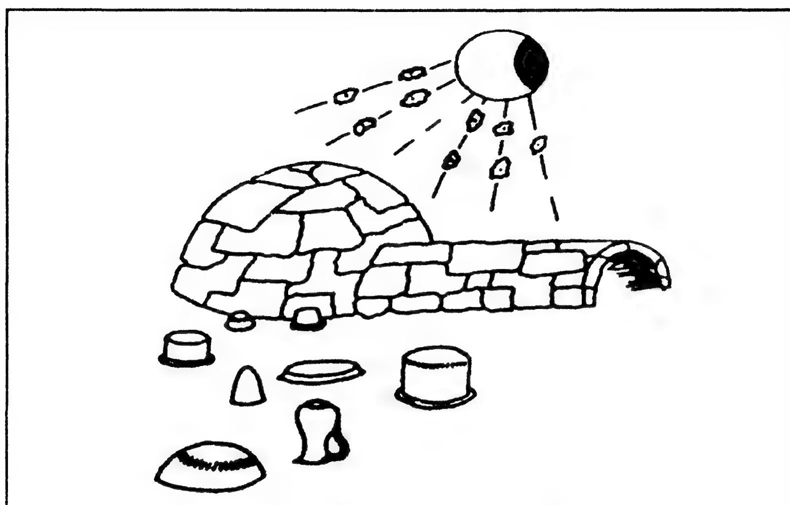


Fig. 8: The Eskimos used to keep their utensils upside down, lest the germ infected rays from the diseased Sun or Moon fall upon them.

eclipse. Underlying this belief is the idea that during an eclipse the Sun and the Moon are diseased for a short period, much like the ordinary humans on the Earth, who fall sick for a while. Therefore, rays from these striken bodies falling on utensils could transmit the same disease to the Eskimos, as well as their respective deities.

The people living along the western coast of Africa believed that the lunar eclipse occurs because of the Sun's shadow, which is always following the Moon. So during eclipses, people gather on the street and shout: 'Leave Him', 'Go away', and so on.

According to the Ojibawas sect of the Red Indians the solar eclipse signifies the extinguishing of the Moon or the Sun for a while. Consequently,

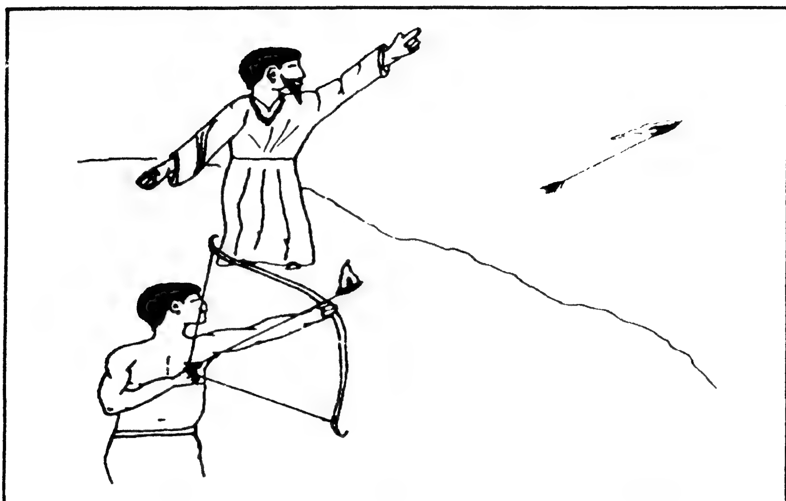


Fig. 9: The Red Indians used to hurl fiery arrows at the eclipsed Sun and the Moon, in order to rekindle their brilliance.

they hurl burning arrows in the direction of the Sun so as to rekindle its original brightness (Fig.9).

The inhabitants of the Tahiti Islands are found to believe that a lunar eclipse is a sign of impending disaster caused by evil spirits. In order to free the Moon from the clutches of these diabolical influences, they gather at their shrines and prey.

The aborigines of Sri Lanka also understand the solar eclipse as an indication of an unholy and

disastrous event and observe a fast on the day of the eclipse.

The Todas from the Nilgiris believe that there is a rabbit on the Moon, which is not very difficult to imagine if one closely looks at the face of the Full Moon. According to them when a serpent swallows the Moon the lunar eclipse begins. In order to drive the serpent away, these people shout and make loud noises; they also fast during the eclipse hours. It seems that they have hardly witnessed any of the total solar eclipses.

The Maoris in Assam and Bihar believe that the lunar eclipse is a sign of imminent victory over their enemy in a war and the collapse of their enemy's fort. It would have been logical for their enemies to also arrive at a similar interpretation. But one has to keep in mind that war always takes place between two communities, religious denominations, or rival rulers. If one of them wins just after witnessing a lunar eclipse by fortuitous coincidence the previous night or within a few days of its rest day, a superstitious belief which attributes final victory in a war to the occurrence of an eclipse is quite natural. In that case, the vanquished party would naturally view an eclipse as a bad omen.

The imagination of the Munda tribes hailing from Bihar, and Bastar region in Madhya Pradesh is quite fertile. They believe that the Sun and the

Moon take loans from a demon, named 'Dhanko'. Their failure to repay within the scheduled period invites imprisonment by their creditors, and therefore, the Sun and the Moon are not seen in the sky at their usual positions. This, in their opinion, is why eclipses take place. So the Munda people bring their utensils, rice and weapons to their courtyards in the belief that the Sun and the Moon will accept these to repay their debts to the demon thereby liberating the Mundas from the ghastly spectre of an eclipse.

In the *Holy Quran*, in the *Sura* of Resurrection *(Al-Qiyama)*, it is stated that before the day of Resurrection, the Moon will be eclipsed, and the Sun and the Moon will be brought together (75: 7-11) It may sound either paradoxical or trivial, depending upon how one is interpreting these words. In the Holy *Bible* (Mathew 24:29), similar statements are recorded about the signs of the future return of Jesus Christ. The Holy Prophet had advised the people to resort to prayer and charity during eclipses, be it solar (*kusoof*) or lunar (*khusoof*). The Prayer Book *(Salat*, p. 66-76) prescribes a two *Rak'aat* prayer on the occassion of any eclipse. In fact, the Holy Prophet performed two *Ruku* in each *Rakat*. The central theme behind this is to rekindle the human spiritual light in the believer's heart while the celestial spiritual light diminishes during eclipses.

The Holy Prophet also stated that a Divine Reformer (Mahdi) would come and His signs would be a lunar eclipse on the thirteenth night of Ramazan (first of eclipse nights) and a solar eclipse on the twenty-eighth day of Ramazan (middle of eclipse days). (*Darqutani*, vol. I, P.188). In fact, eclipses have played very crucial roles during the formative phases of Islam.

The birth year of the Holy Prophet Muhammad (A.D. 569-570) was also a year of total solar eclipse (on A.D. 24 November 569), with its path of totality passing within about a thousand kilometers of His birth place. This was in concurrence with the prevailing notion that a total solar eclipse ushers in a new regime or signals the downfall of older dynasties, although the *Quran* does not make a causal connection between these two events. However, the tragic death of the Prophet's infant son, Ibrahim, on A.D. 22 January 632 coincided with the occurrence of an annular solar eclipse. On A.D. 2 July 632 another annular solar eclipse took place when Mu'awaiyah (the son of the chief Meccan enemy of Ali) assumed leadership after the revolt against Ali (who was Prophet's son-in-law), and decided to transfer the Prophet's pulpit from Medina to his capital in Damascus, Syria. Due to the occurrence of an annular solar eclipse during the raising of the pulpit, the mission was abandoned.

Generally, the Jains also regard an eclipse (solar and lunar) as a bad omen, and have laid down certain rituals to ward off their ill effects. A total solar eclipse is thought to be the sure cause of the death of the king or some such highly placed person. If two eclipses occur during the same month, it is believed to be a definite harbinger of some great calamity, such as a war.

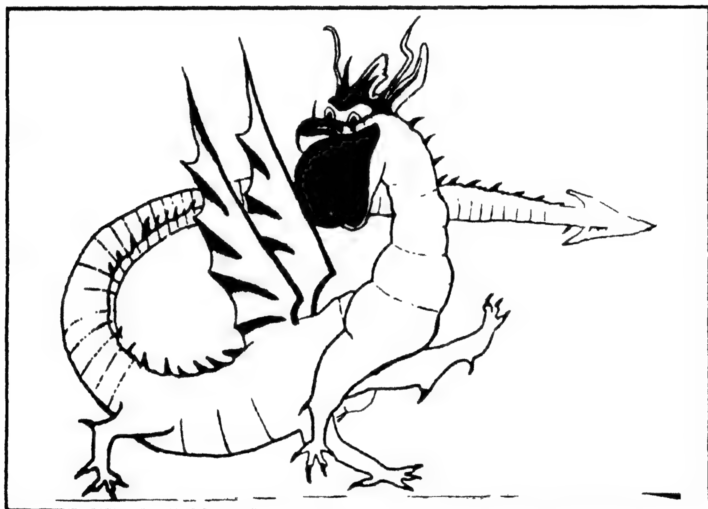


Fig. 10: The belief that the Sun or the Moon is engulfed by a dragon or Rahu during an eclipse is widely shared by the Hindus, Buddhists, Jains and Chinese.

The Buddhist tradition interprets eclipses as being caused by two demons, namely Rahu and Ketu, devouring the Sun and the Moon (Fig. 10). Many Buddhist scriptures, written in Pali language, refer to eclipses caused by Rahu and Ketu.

This issue will be dealt with in more detail in the context of the beliefs and practices of the Hindus in the following section.

* * *

Concept and Perceptions of Eclipses in Hindu Mythology

THE *vedas* are considered to be the ultimate authority by the Hindus, much like the *New Testament* and the *Quran* by the Christians and Muslims, respectively. The *Rigveda* is generally believed to be the oldest of all the four *Vedas*.

The Rishi Yaska applauds the Moon for its ability to reflect the sunlight as seen from the Earth (*Nirukta* 2.6), a fact duly reiterated by the Rishi Gotama, son of Rishi Rahugana (*Rigveda* 1.84.15). In those days, the Full Moon was referred to as Raka and the New Moon as Sinivali (*Sayana Bhasya*, and *Rigveda* 2.33.8). The cause of the eclipses is ascribed to a demon, called Svarbhanu, striking the Sun with darkness. When the gods could not discern the Sun (hidden as it was by darkness), they invoked Rishi Atri who repelled its darkness by chanting four Rik mantras (*Rigveda* 5.40.5-6) Before he could chant the four Riks, which must have taken at least 50 seconds, Atri must have had to be informed by his disciples or his sons about the sudden darkness that fell upon the Earth; in which case, the actual process must have lasted a few minutes--the typical duration of a

total solar eclipse. In the ninth Rik of the same *sukta*, it is clearly mentioned that only the students and descendants of Atri knew how to dispel the sudden darkness which befell the Sun. It can perhaps be interpreted that only these people knew how to predict the duration of a total solar eclipse.

Even more revealing passages exist in the *Pancavimsa Brahmana* which describes Atri's dispelling of the darkness by the four Riks in four steps: the first part of the darkness he repelled became a reddish sheep (solar chromosphere), the second part he repelled became a silvery sheep (solar corona!), the third part again became a reddish one, and the fourth a white sheep (regaining the original colour.)

One of the six *Upavedas* or *Vedangas*, namely the *Vedanga Jyotisa*, supposedly composed by Rishi Lagadha around 1300 B.C., makes no mention of the eclipse calculations, even though the concepts of astronomical time divisions are present in great detail.

It is also to be noted that Rahu is nowhere mentioned in the *Rig, Sama and Yajurveda*. In the *Atharvaveda*, (13.2.16-18,28) the description of Ketu is more suited for what we today call a comet. In the primitive form of astrology, there was no place for Rahu and Ketu, in particular in the

manner in which the division of the twelve houses among the five planets, the Sun and the Moon was conceived. However, Rahu has been earmarked for a quota of twelve years in the *aṣṭottari dasā* system, in addition to the quotas for the seven other regularly wandering celestial objects.

In the original version of the *Valmiki Ramayana*, a vivid description of a total solar eclipse is given in the first fifteen *slokas* of the twenty-third *sarga* of the *Aranyakandam*, but there is indeed a mention of Rahu as the cause. The description, which appears in the context of a ravaging war between Khara and Lord Rama is worth quoting:

> In the proximity of the Sun there appeared a dark reddish disc; at an odd hour of the day the evening dusk approached at an extremely fast pace to be followed by a sudden nightfall; nothing could be discerned anymore; the birds and the animals became awestricken and started howling at the top of their voice; the Sun was totally engulfed by Rahu and appeared to be totally dull, but a big halo was seen around the dark disc of the Sun; some stars and planets became visible....

In the *Navagrahastotrom*, supposedly composed by Vyasadeva, the description of Rahu fits quite well with that of its Pauranika version. However, the description of Ketu is more akin to that of a comet devouring stars as well as planets.

No eclipse can come in the way of the stars and planets exclusively, except for the bodies themselves.

It is suggested in the *Mahabharata* that during the 18- day long war between the Pandavas and Kauravas, there were only thirteen days between a Full Moon and a possible total solar eclipse presumed to have been seen over the battle field of Kuruksetra. Now, as we noted earlier, a similar condition was invoked in the *Holy Quran* for prophesying the return of Muhammad in the future. It is therefore, the expected rarity of such an event that must have been known to the authors of such holy scriptures.

A sizable portion of the 35th chapter of the *Bhagvata Purana* is devoted to narrating a fable as to why Rahu and Ketu are responsible for all the solar and lunar eclipses. Initially, at some stage,the gods and the demons were engaged in a great war over a very long period. Lord Visnu persuaded both the gods and demons for a temporary peace so that the ocean in its entirety could be churned and both *devas* and the *asuras* could benefit from what the sea had to offer. The gods under the leadership of Indra grabbed the tail of the king of snakes, Vasuki, who was used as a rope for churning the ocean, while the demons under the leadership of Vali held the mouth of Vasuki. The great mountain Mandara acted as the churner. As a result of this churning,

the first to come out was the terrible poison, *halahala*. It was voluntarily sucked in by the Lord Siva, but he held it in his throat, the reason why Siva is also known as Nilakantha. Then out came Surabhi, Kaustubha, Parijata, Laksmi, the Moon, Varuni (the goddess of wine). And finally emerged Dhanvanatari, the originator of medicine, with a pot of *amritam*, the nectar. The demons ran away with the pot. Lord Visnu acting in the interest of the gods transformed himself into Mohini, a beautiful woman. Dazzled by her beauty, the demons offered the pot to Mohini and asked her to distribute the nectar amongst themselves as she was found to be an appropriate person. Of course, she gave all the nectar to the gods. One of the demons, Rahu, saw through the trick and sat in the line in disguise, where the nectar was being distributed. But before he could swallow the divine nectar, the Sun and the Moon detected his masquerade and reported it to Lord Visnu, who then chopped off Rahu's head with his *sudarsan cakra*. Because Rahu had already drunk the nectar, he remained alive in spite of his being reduced to a trunkless body. Since then Rahu has not forgiven the Sun and the Moon. And this is the reason why, as has been depicted in the style of Pauranik description, every once in a while Rahu gobbles up the Sun or the Moon and we witness the solar and the lunar eclipses. Of course, being trunkless he cannot hold either the Sun or the Moon for long, and they come out safely after a while. With time the headless

trunk of the demon came to be known as Ketu, and the earlier version of Ketu gracefully turned into what is known as Dhumketu.

Since then, Rahu has become acceptable as the eighth planet, and in the astrological formulations, we find it in the *astottari dasa* system. Later on, another dasa system, called the *vimsottai dasa* system, was introduced which referred to nine ruling planets, the ninth being Ketu.

Sometime in the third century A.D., the era of Siddhantas was ushered in. The *Surya Siddhanta* gives detailed methods for making ecliptic calculations. It was around this time that Rahu and Ketu were astronomically defined to be the ascending and the descending nodes of the lunar orbit, intersecting the plane of the Earth's orbit. The astronomical significance of Rahu and Ketu was reduced to mere imaginary points of intersection between the lunar orbit and the plane of the ecliptic.

As we have noted earlier, evidence for observation of eclipses is found in the ancient Indian texts. A solar eclipse finds mention in the *Mahabharata*, where Lord Krisna skillfully uses his knowledge of eclipse predictions to save the life of Arjuna, the great warrior. The accuracy with which eclipses have been predicted is incredible. In the Indian almanacs, the time at which an eclipse

begins, at which it peaks, and when its ends have all been given. This entire period of an eclipse is *called the parvakala*.

Thorough prescriptions of the customs which an orthodox Hindu is supposed to observe on the eclipse days are given in the *Manusmriti*, *Grahalaghava*, *Nirnaya Sindhu*, and a number of similar textbooks including *Atharvaveda*.

It is suggested that the inauspicious period actually begins about four *praharas* before a solar eclipse and three *praharas* before a lunar eclipse, (*prahara* being the unit of time equivalent to one-eighth of a day). Since food prepared during this period is not supposed to be consumed at any time, Hindus generally observe a fast. The water, clothes, food grains, etc., are sprinkled with the sacred *tulasi* leaves. People take a bath as soon as the eclipse begins and also perform rituals like *tarpana, sraddha, homa, prarthana* and give donations. After the eclipse is over, one is suppose to take a bath once again. To erase the unholy shadow of Rahu that has fallen on one and all and avoid its ill-effects, another bath is prescribed after the eclipse is over. However, married women are not allowed to wash their hair.

On the other hand, it is believed that during an eclipse all the water becomes as pure as the water of the holy river Ganga. Any surging water

(say, waterfall or a fountain) or water in the lakes, river and the seas is regarded as a good omen, its auspiciousness increasing in the above sequence. The more pious may go to some sacred place or to the nearest seashore for taking a holy bath. There is a strong belief that any donation given during the eclipse hours is most auspicious and valuables such as money, clothes, cows, horses, land and gold are to be gifted away. The very rich might weigh themselves against brass or copper utensils or even gold or silver, and the same amount is recommended for donation. During this period, circling around a cow giving birth to a calf is equivalent to walking (*pradaksina*) around the earth.

If the death anniversary of the clan ancestors falls during this period, the rites are not performed in the usual way by feeding the Brahmanas; instead, the *grahansraddha* should be performed with ordinary or uncooked food or, more simply, by donating gold to the priest. Such rituals can be performed even at night as there are no restricted hours. This in itself is contrary to most of the conventional practices which are performed during the daytime, and shows to what extent our ancestors were awestruck by these celestial phenomena.

It is believed that if the eclipse falls on the third, sixth, eleventh or tenth *rasi* house from the zodiacal sign of birth (solar or lunar, depending on

the parts of India one belongs to), it is auspicious and brings good luck to the native; a solar eclipse falling on the second, seventh, ninth or the fifth place of the natal *rasi* is regarded as moderately auspicious; but if it falls on the fourth, eighth or twelfth place of the natal *rasi*, it is considered to be inauspicious and brings bad luck to the person born under these signs.

Those whose birthdays fall on eclipse days should not look at the Sun, while others can look at the eclipsed Sun, but not directly. Such a person is permitted an indirect view of the eclipsed Sun, such as its mirror image from a pot full of pigmented water, or through a cloth. Besides these, there are injunctions against shaving, and cutting one's hair or nails on the eclipse day. This is also the day when no initiative or effort of profound consequence should be taken, and nor should students engage in serious studies.

Thus eclipses are fascinating not only because they have astronomical significance, but also ecause they give us insights into the culture, tradition and beliefs of people belonging to different periods.

* * *

Possible Rationale Behind Persisting Superstitions

THE moon and the Sun were widely regarded as gods. The Chinese civilisation believed that the king was the incarnation of the Sun god. The same was true of the ancient Egyptians, who believed that Pharaohs were the direct descendants of the Sun god.

This is one of the reasons why the king himself took to moving around the Sun temples in circles during a solar eclipse. In the event of a disturbance in the very regular movements of the Sun god, believed to have been caused due to some illness or a temporary attack, the human incarnation took it upon himself to maintain the stability of the cosmological order. Closer home, we find that both the Sun and the Moon were thought of as equally important, with dynasties descending from both of them. In the great epic *Ramayana*, the dynasty of Lord Rama was a descendant of the Sun (*Suryavamsiya*), while in epic *Mahabharata* the dynasty belonging to the Kuru and Paṇdu is supposed to have descended from the Moon (*Candravamsiya*).

Hence, the logic went : If the gods could be

attacked and reduced to such a pitiable condition, how secure would a common man feel? It was this insecurity which lead the Eskimos to turn their vessels upside down during an eclipse. This was to protect their food and belongings from the attacking solar (or lunar) germs, and all the unknown, harmful things that were attacking their Sun (or Moon) god.

However, the Hindus would lock themselves up in their houses and keep their doors and windows shut in order to protect themselves from the ill effects of the rays falling all over. This practice has a very scientific origin, in the event of the solar eclipse. When we look at the Sun directly, without any filter, that part of the retina where the tiny solar image falls suffers from burns. Sometimes the sunburn of the retina is so severe that it might take several days to recover, if not be permanenly damaged. A solar eclipse would rouse the curiosity of most people, particularly when its time is mentioned in the locally available almanacs. Given the painful experience of eclipse-blindness, injunctions against direct viewing have come down the ages in the form of scriptural restrictions that one and all have to strictly abide by.

In the event of a total solar eclipse, the expected damage to the exposed rods and cones of the human eye is at least ten times more severe than when casually looking at the Sun during partially,

eclilpsed or uneclipsed states. During the period of totality the sudden nightfall draws everyone outside to view the Sun. But because of the complete darkness everywhere, which lasts no longer than seven-and-a-half minutes, the dilation of the eyehole (the iris) is at least three times that in conditions of normal daylight. It means that the dilated eyehole now allows ten times more light on the retinal cells than would the normal eye. The potential of the Sun to inflict retinal burns would increase tenfold after its sudden emergence from the totally eclipsed stage. There are definite chances of permanent loss of eyesight during this sudden reappearance of the crescent Sun, however thin it may be, after the total phase of the solar eclipse is over. Therefore, it is no wonder that the authors of *Smriti, Purana* and other holy scriptures prohibited the viewing of a solar eclipse at any cost. The wandering monks, being highly regarded in rural Indian society, would time and again urge the people to adhere to such scriptural injunctions based upon their own experiences. This is how the eclipse taboo became institutionalised in India. The holy scriptures have also suggested that those driven by curiosity to look at an eclipsed Sun may do so through a smoked glass. Given the level of technological developments in those ancient epochs, no better alternative could have been suggested to the general public.

Given all the credible data sets, accumulated

over several millennia, it was still a non-trivial task to predict whether a total solar eclipse would be visible from any given place within the geographical territory of a kingdom. Therefore, wise men never resorted to the risky practice of predicting solar eclipses, because even a small mistake on the part of a *pancanga*-makers could have a devastating impact on the lives of the citizens. All these scientific facts help explain the scriptural injunctions on even a partial viewing of a solar eclipse.

Given the size of a country such as India, the probability of a total solar eclipse being visible from some or the other part of the country is once every thirty years. Some of the wandering monks were quite likely to experience a total solar eclipse in their lifetime. More recently, let us quote a passage from the experience of the world-famous, Indian astronomer, Dr. Vainu Bappu, during his scientific expedition to Mexico for the total solar eclipse on 7 March 1970:

> So one goes along with this decrease in intensity until say about two to three minutes before totality when, if one is located on a hilly terrain or if there are clouds near the western horizon, you begin to notice the shadow approaching you. The shadow moves in at a speed of 800 m/s [in the case the forthcoming eclipse the speed is about 1.6 km/s; please excuse the author for this comment in parenthesis]. So if you have the presence of mind to look out in the west, say about a minute before totality, you see it sweeping fast and

coming towards you. A minute before totality you see another phenomenon, if the atmosphere is unsteady that day. You see what are known as shadow bands. These are equivalent to scintillation effects that you notice because by that time the Moon would have covered most of the Sun and the last rays coming from the bright visible disc would be shining through the valleys and therefore would be as individual bright points equivalent to stellar case. Each such source produces a scintillation pattern, with the result that if you are fortunate enough to see shadow bands, you find a kind of rippling motion on the ground coming towards you. The feeling, I had watching shadow bands at the 1970 eclipse, was that momentarily I was in a sort of a snake pit with reptiles crawling all over me. It is only then I realized that I was seeing shadow bands and because I was located out in the open and one of my tasks was to announce the commencement of totality, I was able to alert the other observer in the team, so that he could also take a look and see this interesting phenomenon. So then, we have reached one minute before totality, and we have seen the shadow bands and now you distinctly see the shadow pass in and come sweeping right over you. When that happens, if you are looking at the remaining crescent of the Sun through a pair of binoculars or even through a monocular with a transmission grating ahead of it, you see flash spectrum. The chromosphere blazes out in full glory and this is an indication that totality has commenced. And then the solar corona in the form of a glowing halo becomes visible for the rest of the few minutes of the totality.

Now, the reader may kindly note that even a

professional, first-rate astronomer (Dr. Vainu Bappu was the first-ever Indian astronomer to discover a comet in 1948, which is named as Bappu-Bok-Newkirk; he was the first Indian to become the President of the International Astronomical Union; he made India's largest optical telescope with a 94-inch aperture, now situated at Kavalur) was bewildered for a moment while seeing the shadow bands. One can imagine how a lay person would experience the shadow bands swirling all around him, just before the onset and just after the completion of a total solar eclipse--as if the entire atmosphere around the observer is polluted with the poisonous exhalations of thousands of optically-elusive snake-like creatures. This might very well be the reason for believing that :

1. The Sun is gobbled up by a snake-like demon or monster or dragon during the total solar eclipse, which is universally true for all the myths that have grown around eclipses.

2. Food prepared during the eclipse will become polluted.

3. No one should eat during the eclipse hours.

4. All doors and windows need to be kept closed.

5. And everyone should take a bath after the eclipse.

So people either fast or do not eat or consume things prepared during this period. One of the reasons why foodgrains are sprinkled with the *tulasi* leaves during this period is their tremendous medicinal value. Again, Indians have always been conscious of the need for cleanliness and its importance to hygiene. Hence to cleanse oneself after an eclipse was a logical step. At the same time the precaution was taken that married women did not wash their hair. This is because washing long hair, particularly late in the night, can be dangerous for health. Sleeping with wet hair can cause cold and fever.

The strict observance of rituals and practices was encouraged by the priestly class, socially the most privileged, to maintain their supremacy in society. This was achieved by playing upon the ordinary people's fear of the unknown and their sense of insecurity. If the gods could be attacked and be visibly humiliated, how vulnerable a mere mortal would be? While practices such as chanting *slokas* or praying, and the rituals of doing *homa*, giving donation, etc., ostensibly gave the people strength and courage to deal with this bewildering event, in reality they served the selfish interests of the most privileged class of society, namely the priests.

Another fallout of the event of witnessing the solar corona during a total solar eclipse was the

practice of glorifying divine characters by depicting them with a glowing halo around the head.

* * *

A few Concluding Remarks

WHILE at a superficial level all these practices may now sound nonsensical and laughable, a more thorough examination would reveal their ingenuity and the underlying rationale; it also explains why they continue to be observed even today. By this we do not mean that all the superstitious beliefs have to be followed to the word. Some of them can definitely be overlooked by merely using a proper solar filter while observing the partial phase of a total solar eclipse. Our eyes should, of course, remain unaided during the brief span of totality, in order not to miss out on one of the most spectacular celestial phenomena, which can only be witnessed during a total solar eclipse. Even scientists, poets and agnostics have unequivocally expressed their experience of totality as something beyond verbal description. Each of us must witness a total solar eclipse at least once in our lifetime.

We do hope that our young readers shall be able to convince their elders in the family not only to allow all the other members to witness this very unique celestial phenomenon that the nature has to offer us, but also unhesitatingly join the collective viewing. It is time to wake up and learn to make a clear distinction between a real superstition and

scientifically approved ways of looking at a totally eclipsed Sun.

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INDEX